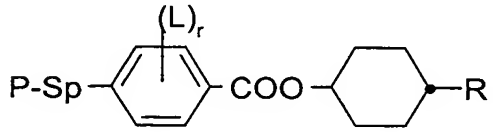
Patent Claims

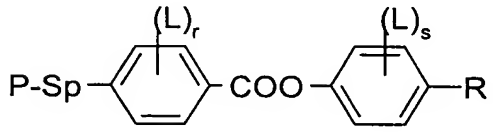
1. A method of preparing a polymer film or marking comprising printing a polymerizable liquid crystal material onto a substrate and polymerising said liquid crystal material to form the polymer film or marking, wherein the polymerizable liquid crystal material does not contain a solvent, thinner, dispersion agent, polymeric binder, or a monomer compound that can be converted into the polymeric binder by polymerisation.

2. A method according to claim 1, wherein the polymerisable LC material is polymerised at a temperature below 60 °C.

3. A method of preparing a polymer film, marking or pigment, comprising printing said polymer film, marking or pigment with a polymerizable liquid crystal material comprises at least one compound of formula I and/or at least one compound of formula II



I



II

wherein

P is a polymerisable group,

Sp is a spacer group or a single bond, and

R is halogen, straight chain or branched alkyl with 1 to 20 C atoms, that is unsubstituted, mono- or polysubstituted, in each case independently, by F,

Cl, Br, I or CN, and wherein one or more non-adjacent CH_2 groups are optionally replaced, in each case independently from one another, by -O-, -S-, -NH-, $-NR^0-$, $-SiR^0R^{00}-$, -CO-, -COO-, -OCO-, -OCO-O-, $-SO_2-$, -S-CO-, -CO-S-, -CH=CH- or -C≡C- in such a manner that O and/or S atoms are not linked directly to one another,

R^0 and R^{00} are, independently of each other, H or alkyl with 1 to 12 C atoms,

L is F, Cl, Br, or an alkyl, alkoxy, alkylcarbonyl or alkoxycarbonyl group with 1 to 12 C atoms, wherein one or more H atoms, each independently, are optionally replaced by F or Cl, and

r and s are independently of each other 0, 1, 2, 3 or 4.

4. A method according to claim 3, wherein the polymerisable liquid crystal material is a nematic material.

5. A method according to claim 3, wherein the polymerisable liquid crystal material is a chiral nematic or cholesteric material.

6. A method according to claim 3, wherein the the polymerisable liquid crystal material has either a nematic phase or a chiral nematic or cholesteric phase at room temperature.

7. A method according to claim 3, wherein the polymerisable liquid crystal material comprises at least one chiral compound which can be polymerisable or non-polymerisable.

8. A method according to claim 3, wherein the polymerisable liquid crystal material comprises at least one compound of formula I and/or II wherein R is a chiral group.

9. A method according to claim 3, wherein the polymerisable liquid crystal material comprises at least one compound which induces and/ or enhances planar alignment

10. A method according to claim 3, wherein the polymerisable liquid crystal material further comprises at least one polymerisable mesogenic compound having two or more polymerisable groups.

11. A method according to claim 3, wherein the polymerisable liquid crystal material further comprises at least at least one polymerisable mesogenic compound having one polymerisable group.

12. A method according to claim 3, wherein the polymerisable liquid crystal material comprises

3 - 60 % of one or more direactive mesogenic compounds,

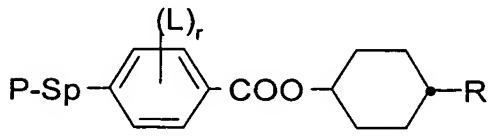
7 - 90 % of one or more monoreactive mesogenic compounds of formula I and II,

0 to 70 % of one or more further monoreactive mesogenic compounds,

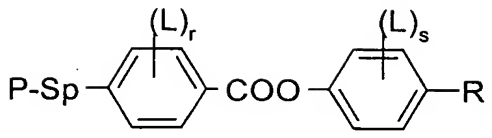
0.1 to 10 % of one or more surfactants, and

0.1 to 10 % of one or more photoinitiators.

13. A polymerisable liquid crystal material comprising at least one compound of formula I and at least one compound of formula II



I



II

wherein

P is a polymerisable group,

Sp is a spacer group or a single bond, and

R is halogen, straight chain or branched alkyl with 1 to 20 C atoms, that is unsubstituted, mono- or polysubstituted, in each case independently, by F, Cl, Br, I or CN, and wherein one or more non-adjacent CH_2 groups are optionally replaced, in each case independently from one another, by -O-, -S-, -NH-, $-NR^0-$, $-SiR^0R^{00}-$, -CO-, -COO-, -OCO-, -OCO-O-, $-SO_2-$, -S-CO-, -CO-S-, -CH=CH- or -C≡C- in such a manner that O and/or S atoms are not linked directly to one another,

R^0 and R^{00} are, independently of each other, H or alkyl with 1 to 12 C atoms,

L is F, Cl, Br, or an alkyl, alkoxy, alkylcarbonyl or alkoxycarbonyl group with 1 to 12 C atoms, wherein one or more H atoms, each independently, are optionally replaced by F or Cl, and

r and s are independently of each other 0, 1, 2, 3 or 4.

14. A liquid crystal polymer, liquid crystal pigment, oriented liquid crystal polymer film or marking obtained from a polymerisable liquid crystal material according to claim 13.

15. A liquid crystal pigment obtained from a polymer or polymer film according to claim 14.

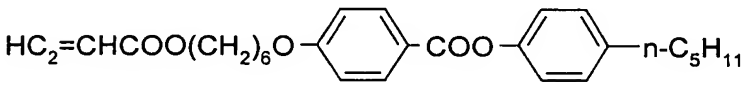
16. An optical, electrooptical, decorative, security, cosmetic, diagnostic, electric, electronic, charge transport, semiconductor, optical recording, electroluminescent, photoconductor and electrophotographic item comprising a polymerisable liquid crystal material according to claim 13, or a liquid crystal polymer, liquid crystal pigment, oriented liquid crystal polymer film or marking obtained from said polymerisable liquid crystal material.

17. A decorative, security, authentification or identification marking, thread or device comprising a polymerisable liquid crystal material according to claim 13, or a liquid crystal polymer, liquid crystal pigment, oriented liquid crystal polymer film or marking obtained from said polymerisable liquid crystal material.

18. A decorative, security, authentification or identification marking, thread or device according to claim 17, comprising at least two chiral nematic materials that differ from each other in their handedness and/or their reflection colour and/or their colour flop.

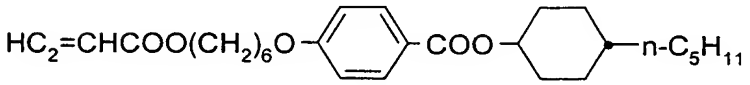
19. An object, document of value or hot stamping foil comprising a decorative, security, authentification or identification marking, thread or device according to claim18.

20. A polymerisable liquid crystal compound that is of formula IIa



IIa.

21. A polymerisable liquid crystal material comprising the compound of claim 20 and the compound of formula Ia



Ia

22. A polymerisable liquid crystal material according to claim 13, wherein
in the compound of formula I or II,
r and s are 0,
P is an acrylate, methacrylate, vinyl or epoxy group,
L is F or methyl, or
R is straight chain alkyl with 1 to 15 C atoms, or
wherein in the compound of formula I,
r is 1 or 2, or
wherein in the compound of formula II,
r or s is 1 or 2, or both r and s are 1 or 2.

23. A polymerisable liquid crystal material according to claim 13, wherein in the compound of formula I and/or II, R is a chiral group.